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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,756	12/13/2005	Yasuhiro Oda	96790P515	6855

8791 7590 11/30/2006

BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER

CRANE, SARA W

ART UNIT PAPER NUMBER

2811

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/560,756

Applicant(s)

ODA ET AL.

Examiner

Sara W. Crane

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 13 Dec 2005.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 11, it is not clear what is y. (Should this be "z"?)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 9-11, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frank et al. in view of Dvorak et al.

With respect to claim 1, Frank et al. teaches with respect to figure 4 to choose materials for emitter, base, and collector of an HBT so that the conduction band edges of the emitter and collector are not less than the conduction band edge of the base, to eliminate current blocking. The base materials are from the group Ga(P, As, Sb) and the emitter and collector materials are from the group (Al, In)(P, As, Sb) (column 5, lines 10-29). Dvorak teaches the combination of InP emitter, with GaAsSb base (title). (As noted in both references, the desired band continuity at the junctions can be obtained with an InP emitter, if the base is approximately GaAs_{0.53}Sb_{0.47} (claim 13 of the patent).

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It would have been obvious to choose InAlP as the emitter material, instead of InP, because the increased range of band gaps available (as in figure 6 of the patent) would allow for an increased range of base materials, while allowing the desired band gap criteria to be met. In addition, InAlP would have been obvious for an emitter layer of an HBT, because this is one of the group of (Al, In)(P, As, Sb) taught for this purpose in the patent, as noted above.

With respect to claim 2, the Dvorak reference teaches the layers in the order recited on InP substrate (column 2, page 361), where the desired band gap relationship is as in figure 4 of Frank et al. With respect to claims 3-6 and 10-11, the various composition ranges all fall with the desired ranges as in figure 6 of Frank et al., and, absent any unexpected results associated with any specific compositions, would have been obvious in order to obtain the desired band gap relationship between layers. With respect to claim 9, InAlP would have been obvious for the collector, for the same reasons discussed above with respect to the emitter (desired continuity of the conduction band edge at the junction with the base). With respect to claim 13, C dopant for an MOCVD-grown base is noted in Dvorak et al., page 362, middle of the paragraph under "DC Performance." The temperature range of claim 14 is recited in product-by-process form, and has not been shown to give rise to structure for the base distinct from that in the references.

Claims 7-8 and 12 are under 35 U.S.C. 103(a) as being unpatentable over the two references cited above, and further in view of Capasso et al., 4,794,440.

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Grading of the band gap at the emitter-base or collector-base junctions would have been obvious for reasons noted by Capasso et al. (increasing the injection efficiency for current passing into the next region, column 2, line 44-46).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (571) 272-1652.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sara W. Crane
Primary Examiner
Art Unit 2811